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Consumer Use of Foods

MEREDITH F. ROBINSON, *Consumer and Food Economics Institute*

The Agricultural Research Service's continuing research program provides basic information for use by extension agents, school lunch personnel, home economics teachers, and other nutrition educators. Improved procedures for preparing and handling food in homes and institutions are developed in the laboratories of the Consumer and Food Economics Institute at Beltsville, Md. The results of this research are published as consumer bulletins and leaflets with instructions for buying, storing, and using food; as recipe card files for small institutions, schools, and child care centers; as food-buying guides for families, schools, and child care centers; and as bulletins concerning food handling, preservation, and safety.

In this issue of Nutrition Program News, we will discuss food research at Beltsville and the materials available to nutrition educators as a result of this research.

FOOD RESEARCH

The Consumer Use of Foods unit of the Consumer and Food Economics Institute is responsible for the development of procedures for the preparation of food in homes and institutions, in various group-feeding programs, and in family food assistance programs. Research is designed to improve methods of food preparation by using donated foods and foods commonly available to homes and institutions.

New food forms and preparation procedures are evaluated for quality and yield of edible food. New procedures for food preparation are tested with special emphasis on time-saving or money-saving techniques. Weights per cup are obtained in grams for each basic ingredient. These weights are used in all recipes to standardize results. As the United States converts to the metric system, these gram weights will facilitate conversion of U.S. Department of Agriculture recipes to the metric system.

Objective measurements and sensory taste panel evaluations are used in research studies. Objective measurements of tenderness, juiciness, viscosity, color, or other qualities are obtained through use of instruments such as the shear

press, penetrometer, viscometer, or color difference meter.

Sensory taste panels consist of trained adults who evaluate products for color or appearance, aroma, texture, flavor, and general acceptability. Panel members are selected for their ability to rate food impartially. All new recipes developed in the laboratories must pass a taste panel evaluation.

Consumer Food Research

Food preparation procedures for homes and institutions include three major areas: preservation, care, and use. Data from this research provide information to help consumers use food in appetizing, nourishing, and economical ways.

Food preservation publications contain information on home freezing and canning of fruits, vegetables, meats, and poultry. Recent work has involved a major revision of "Freezing Combination Main Dishes." Information is given to help the homemaker prepare and freeze meals made from her own recipes.

Recipes for 24 servings were developed so that a homemaker could immediately serve one meal with six servings and then freeze three more meals for later use. Storage studies were conducted to determine the acceptability of the food after 2, 4, and 6 months storage at 0° F. Taste tests were conducted at each time interval to determine overall quality and to make certain that no rancidity or off-flavors developed. Time required to reheat the frozen food to serving temperature was determined. These times varied with each food and are listed with the recipes. A similar bulletin that features poultry main dishes is now being prepared for publication.

A storage study was conducted for the revision of "How To Make Jellies, Jams, and Preserves at Home" in response to questions about spoilage of home-prepared jams and jellies. Jams, conserves, and preserves were processed in a boiling water bath canner before storage or were stored unprocessed. Samples were stored at 75° F and 85° F for 6 months. A panel evaluated the samples at the time

of preparation and again after a 6 months' storage period to determine the effect of processing and storing on the quality of jams and jellies.

Safe care of food in the home involves proper storage to maintain high eating quality and proper handling to assure that the food is safe to eat. Guides have been developed for length of time and temperature at which to store purchased frozen food and other perishable foods to assure retention of high eating quality.

These guides are general and conservative because of the many unknown factors such as the initial quality of the food and the storage conditions in the home. "Keeping Food Safe to Eat" is a popular publication that contains information on safe handling of food and gives special attention to foods that can cause problems if not handled properly.

Food use publications include "Family Fare," the USDA's number one publication in terms of number of copies distributed. Family Fare is intended for people with little knowledge of food. It contains nutrition information; guidelines for food selection; basic cooking information; and tips for buying, storing, and using a variety of foods and recipes.

Besides Family Fare, there is a series of 13 publications on various agricultural commodities, such as fruits, vegetables, eggs, poultry, and cheese. This series is designed to give consumers more information on buying, storing, and using a specific commodity. Recipes in these bulletins give the number and size of servings, calories per serving, and menu suggestions to accompany main dishes. Variations, including a lower calorie version if possible, are given for many recipes.

For a revision of "Baking for People With Food Allergies," flours other than wheat, such as those made from barley, oats, corn, soybeans, potatoes, rye, tapioca, or rice, were tested in a variety of breads, cookies, cakes, and other baked products. Milk and eggs were also eliminated from many products. Food allergies are a special problem for children, particularly those who must carry a lunch to school. An effort was made to develop baked products that could be easily carried in a lunch and that would not look too different from food carried by children who do not have allergies.

Yield data from laboratory records have been published in the "Family Food Buying Guide." This guide helps consumers calculate how much food to buy in order to provide the amount of prepared food needed for their families. It is also helpful in determining the most economical form of food to purchase by showing how to compare the costs of various market forms and of different size containers.

A card file of recipes for quantity service is designed for small institutions such as nursing homes, camps, or

hospitals. Information on food safety, recipe adjustment, calculation of food costs, amounts to buy, and basic quantity food preparation procedures, will help food service managers who have only limited backgrounds in quantity food production.

These recipes have been simplified for use by persons with little training in quantity food service. Convenience forms of foods, such as dehydrated onions, are used to save time and labor. Recipes in this file are for 100 servings. Some of these recipes, in 25 servings, were published in a bulletin entitled "Cooking for Small Groups." This publication helps people who are preparing food for family reunions, club luncheons, or small community dinners. A guide is included to adjust the recipes to serve from 15 to 50 people.

Other research is conducted to update basic information presented in publications. For example, a recent study of fresh and homefrozen vegetables provided data for revising cooking timetables.

In other studies, chicken, turkey, beef, lamb, and pork have been cooked from a frozen and from a thawed state to determine differences in yield and palatability. If there is no difference, homemakers could save time by omitting thawing entirely and cooking meat directly from the frozen state. This would also lessen the chance of bacterial contamination from improperly thawing the meat before cooking. Findings from these studies will be incorporated in the directions for cooking meat and poultry in various publications.

Food Research Backstops Action Programs

Research for use with school lunch, general group feeding, and family food assistance programs is conducted by the Agricultural Research Service under an agreement with the USDA's Food and Nutrition Service. The laboratory research is done in Beltsville, and the results are published by the Food and Nutrition Service.

The group-feeding project provides USDA distribution programs with food use information, including recipes, buying guides, and other guidance materials for food service programs in schools, child care centers, and summer recreational centers. This material is also used by other institutions, such as convalescent homes, prisons, and the like. New and modified foods for use in group-feeding situations are also evaluated.

"Quantity Recipes for Type A School Lunches," a recipe card file, is primarily for schools that participate in the federally funded school lunch program, although it is available to anyone with an interest in group-feeding programs for children. The Type A pattern is defined in the card file. Each recipe must meet one or more requirements of the Type A pattern or combine with other foods that contribute to these requirements.

The place of the recipe in the Type A pattern is given on the recipe card. Recipes that may be used as a main dish or that give meat or meat alternate credit also include two suggested menus that fulfill the Type A requirements. The recipes are standardized to:

- Use common ingredients or commodities distributed by USDA.
- Specify amounts of ingredients that are easy to weigh or measure.
- Use equipment generally available in school kitchens.
- Provide reasonable size servings to school age children.
- Offer a stated number of servings of a specified size.

All recipes are checked to determine their contribution to the Type A meal pattern before they are tested in 25 servings. Recipes are also tested in quantities to serve groups of 100 before they are added to the card file. At present, all recipes are evaluated by an adult sensory panel, but a pilot study has been conducted to determine the feasibility of using a children's panel.

The Type A pattern has been modified for child care centers and summer recreational programs. A special recipe card file and a food buying guide for use in child care centers are now being distributed. For this recipe file, some school lunch recipes were adjusted for smaller portions, and some new recipes that appeal to young children were developed.

School lunch managers operate on limited budgets that require careful planning and economical purchasing. A food buying guide has been prepared to help managers purchase adequate amounts of food to serve the required numbers of children without costly leftovers. This guide is based on laboratory records of weights, measures, and yield of the finished product.

New foods and food forms considered for distribution to the schools, such as textured vegetable protein and dehydrated vegetables, are tested to provide yield data, storage information, and suggested uses. This information is distributed in factsheets that also contain recipes, buying guides, and some information on nutrients provided by the product. As an example, food use information for dehydrated (instant) sweetpotato flakes was recently developed to help school lunch personnel use this unfamiliar product. In addition to storage and yield information, this factsheet contains recipes for biscuits, main dishes, vegetable dishes, and desserts that feature sweetpotato flakes.

Protein-fortified, enriched macaroni products, including macaroni and spaghetti, were evaluated by the laboratory to provide food use information for schools. Because of the protein fortification, 1 ounce of the less expensive dry macaroni or spaghetti can replace 1 ounce of the more expensive cooked meat and thus lower food costs. When the cooked macaroni or spaghetti replaces one-half of the more flavorful meat or meat alternate, the resulting product

is often too bland. To improve flavor, it is often necessary to use a recipe with a more concentrated broth as a soup base, to add seasoned croutons as a garnish, or to retain beef drippings.

Many schools have been able to participate for the first time in the school lunch program through the use of cup-can entrees. The cup-cans are heated to serving temperature in a specially designed oven. A study was made to determine how safe conventional equipment in school kitchens is for heating cup-cans. Heat penetration was measured with a potentiometer, while cans were heated in a convection oven, a bake deck oven, a family oven, a compartment steamer, and a water bath.

Enough cup-cans were used in each test to simulate a normal load. Uneven heat distribution in the conventional equipment caused some cans to reach an extremely high temperature before all the cans reached serving temperature. The results of this study indicate that specially designed ovens are consistently safe to use to heat cup-cans in a school lunch program. Convection ovens may or may not be safe—each model would require testing to determine appropriate times and temperatures when used for this purpose.

Research for family food assistance programs aims to develop simplified recipes and other food use information for low-income families. Families who participate in the USDA food distribution program or the food stamp program need recipes to:

- Use limited equipment (no electric mixers, little use of ovens).
- Use few ingredients and simple procedures.
- Use inexpensive, easily available foods.
- Provide nutritious food suitable to the food needs and preferences of the recipients.
- Use simple wording at about the fourth-grade reading level.

Using these guidelines and donated foods, home economists have developed recipes that are inexpensive and easy to prepare. Field tests carried out under contract with five universities in different areas of the United States evaluated the ease of preparation and acceptability of meals prepared by using many of these recipes by low-income families. The results of the laboratory work are published as a series of leaflets, "Food for Thrifty Families," and in a new publication, "Cooking for Two." Although this material has been designed for low-income families, it has also been used for teaching the deaf, young cooks, and people who understand little English. Some of this material has been translated into Spanish.

New food products developed by Government and industry, especially those considered for USDA's food distribution program, are evaluated for overall acceptability. General use directions and recipes are developed for these

products. Foods already being distributed may be reevaluated and compared with similar products available in the retail market.

Donated and commercial brands of shortening for example, are currently being compared. The shortenings are used in piecrusts, biscuits, and cakes. Degree of hardness of the shortenings at a given temperature, the compressibility of the cakes, and the texture or tenderness of the pastry crusts and biscuits are being measured objectively. These measurements are compared with sensory taste panel ratings.

Storage studies of selected products are conducted to evaluate quality retention. Low-income families want to use convenience foods, such as biscuit or pastry mixes, but they usually cannot afford them. To help these families, formulas were developed for biscuit, cornbread, piecrust, muffin, yeast bread roll, pudding or pie filling, and white sauce mixes, using donated commodities primarily.

All mixes were stored at 70° and 90° F except the pudding or pie filling and white sauce mixes, which were stored at 40° F, because they contain powdered milk or egg mix. Products made from the mixes were evaluated by a taste panel initially and again after 2, 4, and 6 months for off-flavors, rancidity, and general acceptability. Instructions for preparing, using, and storing these mixes will be available to low-income families.

Publication of Research

Research results are published in professional journals, research reports, and USDA bulletins, leaflets, and program aids. The following is a list of USDA publications produced by the Consumer and Food Economics Institute laboratories at Beltsville, Md. Some publications are published cooperatively by the Agricultural Research Service with the Food and Nutrition Service or with the Extension Service.

Single copies of free publications are available through the Office of Communication, U.S. Department of Agriculture, Washington, D.C. 20250. Starred publications are for sale only and must be purchased at a Government Printing Office bookstore or ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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Food Preservation

- HG-8 Home canning of fruits and vegetables.
- HG-10 Home freezing of fruits and vegetables.
- HG-40 Freezing combination main dishes.
- *HG-56 How to make jellies, jams, and preserves at home. *30 cents*
- HG-70 Home freezing of poultry.
- HG-92 Making pickles and relishes at home.
- HG-93 Freezing meat and fish in the home.
- HG-106 Home canning of meat and poultry.

Care of Food in the Home

- HG-69 Home care of purchased frozen foods.
- HG-78 Storing perishable foods in the home.
- HG-162 Keeping food safe to eat.

Food Preparation

- HG-1 Family fare.
- HG-43 Money-saving main dishes.
- HG-103 Eggs in family meals.
- HG-105 Vegetables in family meals.
- HG-110 Poultry in family meals.
- HG-112 Cheese in family meals.
- HG-118 Beef and veal in family meals.
- HG-124 Lamb in family meals.
- HG-125 Fruits in family meals.
- HG-127 Milk in family meals.
- HG-147 Baking for people with food allergies.
- HG-150 Cereals and pasta in family meals.
- HG-160 Pork in family meals.
- HG-161 Apples in appealing ways.
- HG-176 Nuts in family meals.
- HG-186 Breads, cakes, and pies in family meals.
- *HG-197 Cooking for small groups. *15 cents*
- *HERR 5 Recipes for quantity service (card file). *\$5.37*
- HERR 37 Family food buying guide.

Group-Feeding Programs

- *PA-270 Food buying guide for Type A school lunches. *\$3.00*
- *PA-631 Quantity recipes for Type A school lunches (card file). *\$8.00*
- FNS-86 Quantity recipes for child care centers.

Family Food Assistance Programs

- *FNS-13 Leaflet—Daily food guide. *20 cents*
- *FNS-14 through 37 Food for thrifty families. *10 cents*